Obsolete and no longer available per 5/10/91 Sample Mail (No record of transfer to obsolete Catalog No.)

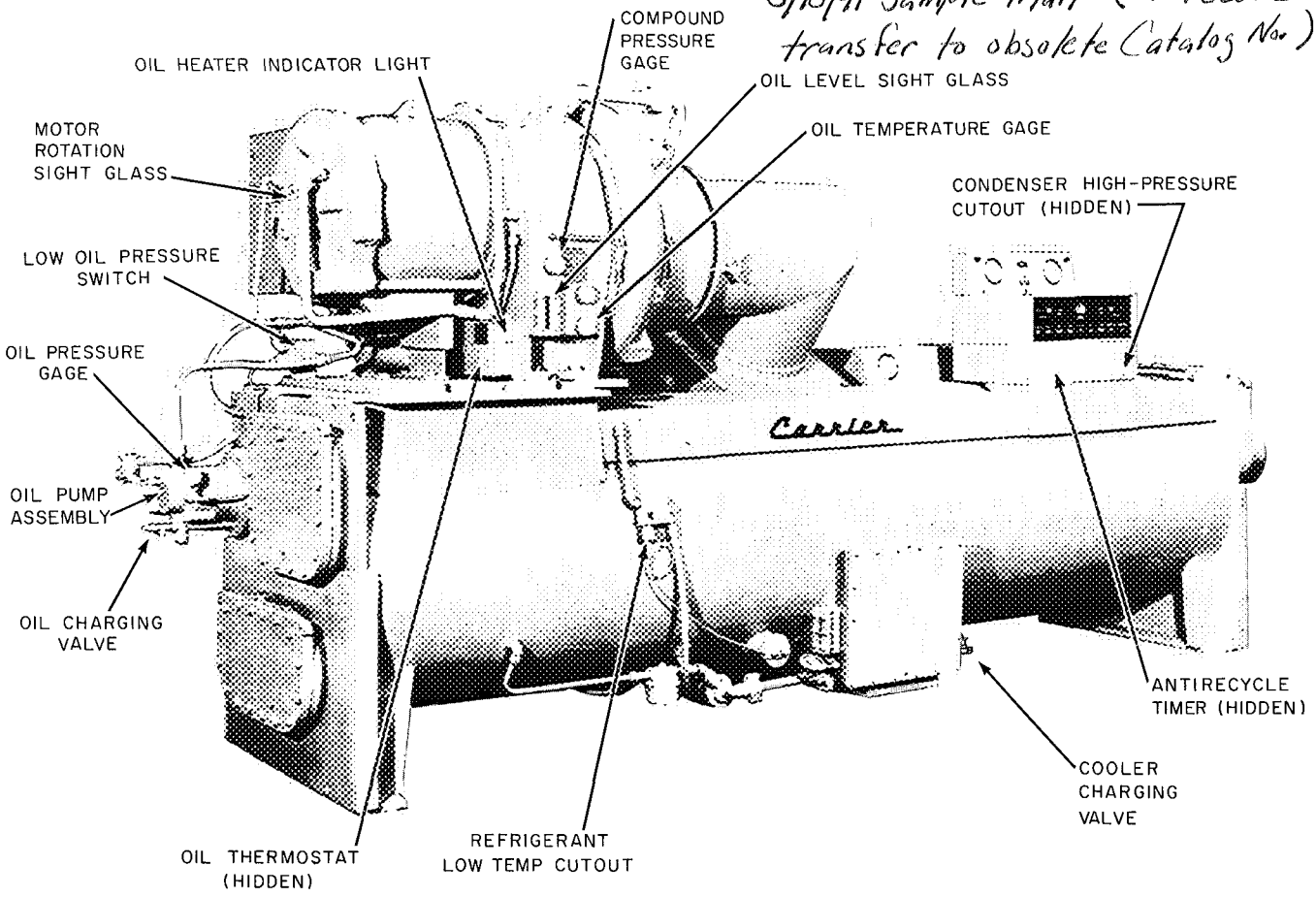


Fig. 1 - 19DA Hermetic Refrigeration Machine

INTRODUCTION

General - Use this booklet as a guide for initial start-up of the 19DA Hermetic Centrifugal Refrigeration Machine. Read and fully understand these instructions plus all necessary Job Data before beginning initial start-up. Instructions are given in the proper sequence for optimum machine performance.

Job Data Required

1. Machine assembly prints
2. Wiring diagrams
3. Starter details
4. 19DA Installation Instructions
5. 19DA Operation and Maintenance Instructions

Equipment and Materials Required

1. Mechanics' tools
2. Volt-ohmmeter
3. Carrier refrigerant drum charging valve
4. 5/8" SAE x 3/4" MPT cooler charging adapter
5. Five to ten ft of copper tubing or plastic hose
6. Halide or electronic leak detector
7. Low-pressure indicator
   a. Absolute pressure manometer
   b. Wet-bulb indicator
8. Clamp-on ammeter
9. Portable dehydration pump

INITIAL PREPARATIONS

CAUTION: Do not operate refrigerant pump unless machine is charged with refrigerant. Do not start compressor or oil pump, even for a rotation check, while machine is at vacuum. Check rotation only after compressor has been charged with oil and machine has been charged with refrigerant.

Machine Tightness - A shipping vacuum was applied to the refrigerant side of the 19DA machine before shipment from the factory. Over a period of time, during shipment or storage, part of this vacuum may be lost. The loss of a small amount of vacuum may be acceptable and within Carrier's machine tightness standards. To determine if the vacuum loss is acceptable or not requires the following steps:

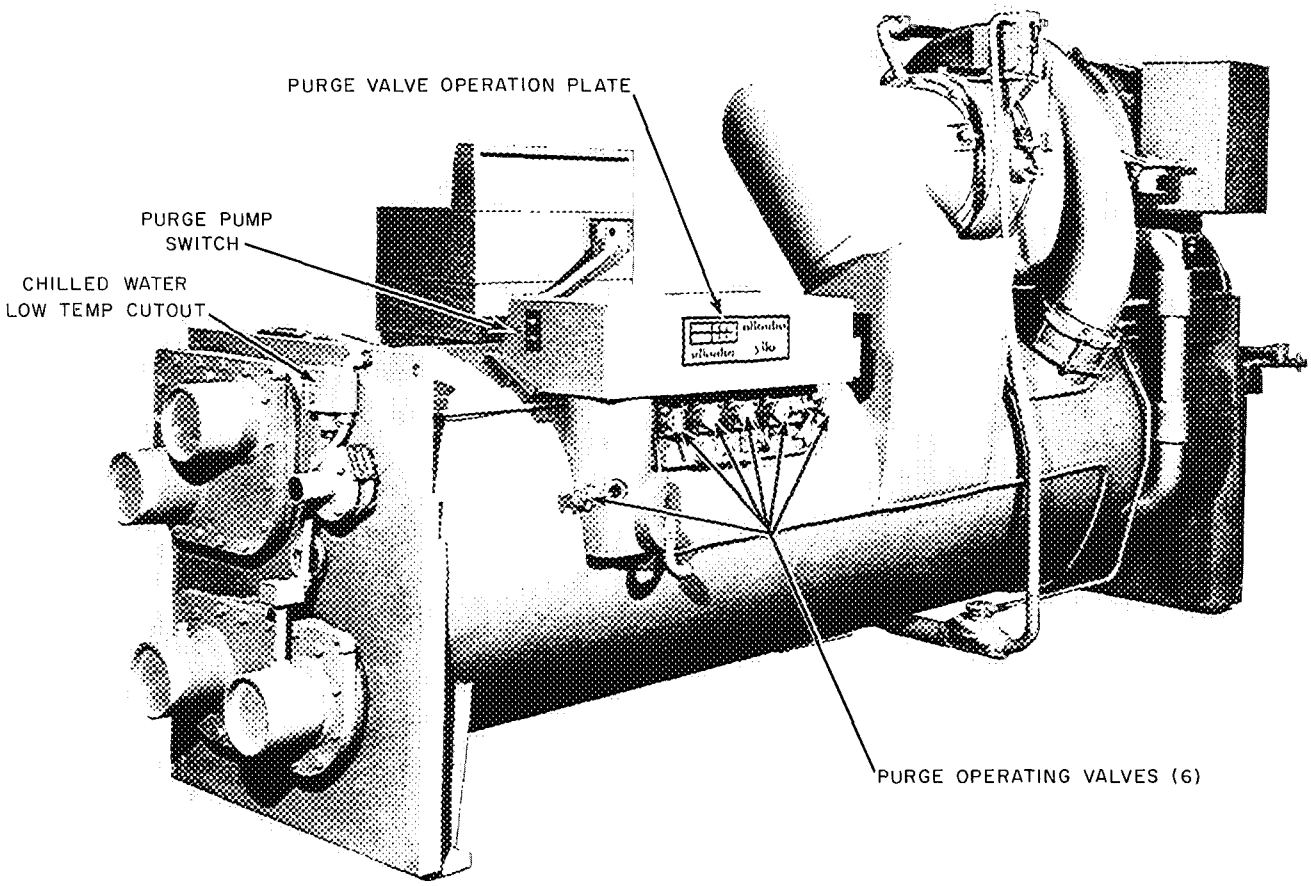


Fig. 2 - 19DA Rear View

1. Record and date vacuum reading shown on compound pressure gage located on compressor (Fig. 1).
2. With this reading and the reading taken when the machine was received, determine vacuum leak rate using the following formula:

   Leak Rate = Vacuum loss ÷ No. of days between readings
3. If vacuum leak rate is 0.05 in. Hg or less per 24 hours, the machine is sufficiently tight. If vacuum leak rate exceeds this rate, perform "Refrigerant Pressure Test" and correct leakage.

EXCESSIVE OR TOTAL VACUUM LOSS - Excessive or total vacuum loss can be caused by accidental opening of a valve or other connection. If this is suspected, proceed as follows:

1. Install a mercury manometer (absolute pressure type) to the cooler charging valve (Fig. 1). A dial type gage can not indicate the small amount of leakage acceptable during a short period of time.
2. Pull a vacuum on the machine equal to 25 in. Hg. Use external vacuum pump or energize purge pump (Fig. 2) using operation No. 2 described on the purge valve operation plate shown on Fig. 2.
3. Let the machine stand with this vacuum, and then perform the leak rate check previously outlined.
4. If the vacuum leak rate is 0.05 in. Hg or less per 24 hours, the machine is sufficiently tight. Perform all steps under "Machine Dehydration" (pg 3).
5. If the vacuum leak rate exceeds 0.05 in. Hg per 24 hours, perform all steps under "Refrigerant Pressure Test" (pg 2) and correct leakage. Perform all steps under "Machine Dehydration."
6. Remove the mercury manometer from cooler charging valve.

REFRIGERANT PRESSURE TEST

1. Pull approximately five inches of vacuum on the machine by energizing machine purge pump (Fig. 2). Use operation No. 2 described on the purge valve operation plate or with an external vacuum pump connected to the cooler charging valve (Fig. 1).
2. Charge approximately one gallon of Refrigerant 11 thru the cooler charging valve. Refer to refrigerant charging instructions (pg 4).
3. Increase pressure to eight to ten psi with dry air or nitrogen thru the cooler charging valve. DO NOT EXCEED TEN PSI.
4. Test all joints, valves, fittings, flanges, etc. with a halide or electronic leak detector.

CAUTION: Due to rupture disc limitations DO NOT EXCEED TEN PSI.

5. Repair any leaks found.
6. Reinspect joints and flanges with the leak detector to ensure that all leaks have been found and repaired.

Machine Dehydration - The refrigerant side of the 19DA machine is dehydrated at the factory. It is usually not necessary to repeat dehydration at initial start-up. However, if the machine has been open for a considerable length of time due to compressor removal, or if there was excessive loss of shipping vacuum, it is recommended that dehydration be repeated.

WARNING: Do not start compressor or oil pump even for a rotation check while machine is under dehydration vacuum.

NOTE: Dehydration is readily accomplished at normal room temperature. If room temperature is high, dehydration takes place more quickly. At low room temperature, dehydration is extremely difficult and special techniques must be applied. Contact your Carrier representative.

Perform dehydration as follows:

1. Connect dehydration pump to the cooler charging valve (Fig. 1).
2. Ensure that all valves on the purge assembly are closed (Fig. 2). Purge valve identification numbers are found on the purge valve operation plate at the valves.
3. Remove the A-B swing connection (shown under Valve Locations on the purge valve operation plate) and connect a mercury manometer (absolute pressure type) to the bottom common connection.
4. Operate dehydration pump until manometer reads 0.20 in. Hg (29.80 inches of vacuum at 30 inches barometer); continue to operate pump for two more hours.
5. Close cooler charging valve; stop dehydration pump; record manometer reading.
6. After a two hour waiting period, take another manometer reading. If reading has not increased, dehydration is complete. If reading has increased, repeat steps 4 and 5.
7. If the reading continues to rise after several dehydration attempts, suspect a machine leak. If this is the case, repeat the refrigerant pressure test.

Inspect Piping - Refer to piping diagrams provided in Job Data and inspect chilled water piping, condenser water piping, and water piping to oil cooler. Ensure that flow direction is correct in all cases and that all specified piping requirements are met.

CHECK WATER FLOW RATE - Water flows thru cooler and condenser must meet job requirements. Measure water pressure drop across cooler and condenser or across the pumps. Check to see that water flow rates agree with the design flow.

Follow the instructions on the caution tag attached to the oil cooler which reads:

CAUTION: Clean water at 85 F maximum temperature to be provided. Valves and/or controls to limit the following:

Max inlet working press.	100 psi
Water vel in tube, ft/sec	10 max - 6 min
Water flow, gal./min	7 max - 4 min
Water press. drop, psi diff	5 max - 2 min

The necessary valves and/or controls are field supplied.

Field Wiring - Prior to starting equipment, refer to wiring diagrams provided in Job Data and check power supply as follows:

1. Connect a voltmeter across power wires to compressor motor starter and measure voltage. Compare this reading with voltage rating on compressor and starter nameplates.
2. Connect voltmeter across power wires to oil pump starter and measure voltage. Compare this reading with voltage rating on oil pump nameplate.
3. Compare ampere rating on starter nameplate with ampere rating on motor nameplate for agreement.
4. Test motor and motor supply cable insulation resistance using a five-hundred volt insulation tester such as a megohmeter. Proceed as follows:
   a. Open starter main disconnect switch.
   b. Test the three phases of compressor motor, phase to phase, and phase to ground, with tester connected on the motor side of the starter contactor in the starter. Take resistance readings at ten-second and sixty-second intervals for each phase.
   c. Divide sixty-second resistance reading by ten-second reading. This gives polarization ratio. The polarization ratio must be 1.15 or higher. The ten-second and sixty-second resistance readings must be 5.0 megohms or higher.

NOTE: The above procedure will check condition of compressor motor and motor supply cable insulation. If above requirements are not met, repeat the test at motor terminals with motor supply cables disconnected.

Check Starter - Before starting the 19DA, check starter as follows:

1. Remove the contactor arc chutes. Be sure contactors move freely, and that shipping string has been removed. Replace arc chutes.
2. If starter has been left on jobsite for a considerable period of time, check contactors for dirt and rust. Clean contact magnet surfaces with emery cloth. Apply a very thin coating of vaseline to magnet surfaces, then wipe it off. If starter has been in a dusty atmosphere, vacuum clean starter cabinet and wipe with a lint-free cloth.
3. Remove fluid cups from magnetic overload relays. Add dashpot oil to cups per instructions on relay nameplate. Dashpot oil is shipped in small vials usually attached to starter frame near relays. Use only the dashpot oil shipped with starter. Do not substitute. Overload relays are factory set for 111 percent of motor full load amperage and resetting is not normally required.
4. Check transfer timer for proper time setting. On Star-Delta starters, timers have adjustable ranges of ten seconds to three minutes and are factory set for one minute. On Auto-Transformer starters, timers have adjustable ranges of ten to forty seconds and are factory set for thirty seconds.
5. With main disconnect switch open, manually open and close main control relay (1CR) to be sure it operates freely.

Charge Oil - Use oil shipped with the machine. Any substitute must meet Carrier's oil specification outlined in 19DA Operation and Maintenance Instructions.

Charge oil thru the oil reservoir charging valve (Fig. 1). With machine at vacuum, oil is drawn from the oil container. Continue charging until oil reaches middle of sight glass (Fig. 1).

CAUTION: After charging oil, energize the oil heater to minimize absorption of refrigerant by the oil. The oil heater indicator light (Fig. 1) comes on when heater is energized. Set oil heater thermostat (Fig. 1) to maintain a minimum oil reservoir temperature of 145 F at shutdown.

Charging Refrigerant - To charge the 19DA machine, proceed as follows:

1. Install a charging valve on the 3/4-inch drum opening as shown in Fig. 3. When the 3/4-inch pipe nipple is screwed into the drum opening, the nipple forces the bottle cap off its seat.
2. Connect a short piece of clear plastic hose or copper tubing from drum valve to cooler charging valve located beneath float chamber.

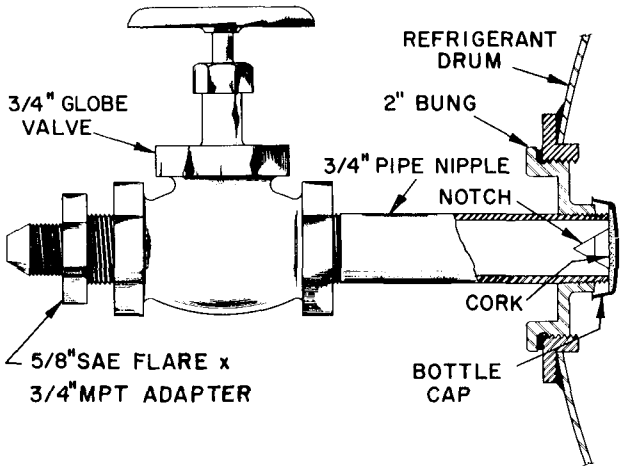


Fig. 3 - Drum Charging Valve and Fitting

3. Start chilled water pump and circulate chilled water during charging process.
4. If machine pressure is eighteen inches of mercury (32 F) vacuum or lower, keep refrigerant drum upright, open valves and admit refrigerant gas to cooler. The machine under vacuum will boil off liquid refrigerant, and raise machine pressure, preventing possible freeze-up.
5. Charge the machine with the proper quantity of refrigerant for the machine size given on a tag attached to the cooler charging valve (Fig. 1) or in Table 1.

   NOTE: The refrigerant supplied with this machine is in excess of that required for initial charging. Use the correct amount as shown in Table 1.

   The machine under vacuum will draw refrigerant from the drum.
6. After machine has been started, it may be necessary to adjust refrigerant charge for optimum machine performance.

   NOTE: Refer to "Trimming Refrigerant Charge" (pg 11) for full load adjustment.

Table 1 - Charging Quantity

MACHINE SIZE	CHARGING WT (lbs)	MACHINE SIZE	CHARGING WT (lbs)
19DA-102	400	19DA-228	575
19DA-112	400	19DA-255	850
19DA-131	425	19DA-284	880
19DA-147	450	19DA-325	900
19DA-160	525	19DA-362	935
19DA-182	550	19DA-397	960
19DA-198	575		

Check Operation of Safety Controls - Disconnect main motor leads at starter to prevent compressor motor operation while performing safety control check. Push the START button. Manually open the following safety controls to be sure they de-energize the 1CR coil, causing the main starter contacts to open and stop the compressor. Anti-recycle timer, item 6, Table 2, can be set for minimum time per this safety check.

1. Chilled water low-temperature cutout and recycle switch (item 1, Table 2).
2. Chilled water flow switch (in chilled waterline).
3. Refrigerant low-temperature cutout switch (item 2, Table 2).
4. Low oil pressure cutout switch (item 5, Table 2).
5. Condenser high-pressure cutout switch (item 4, Table 2).
6. Bearing and motor winding high-temperature cutout switch (in motor terminal box - remove one wire to OPEN switches).
7. Oil pump starter auxiliary contact (in oil pump starter).
8. Chilled water and condenser water pump safety interlocks (in pump starters).
9. Any other interlock shown on job blueprint.

Purge - Open all purge operating valves (Fig. 2). Place valves in NORMAL AUTOMATIC position. Operate purge pump momentarily by placing purge switch in MANUAL position. Then place purge switch in AUTO position.

START-UP

Preliminary Checks

WATER SUPPLY - Before checking compressor rotation, ensure that water supplies to the cooler, condenser, and oil cooler are available, and that the water pumps are running.

COMPRESSOR ROTATION - Set capacity control to MANUAL (Honeywell), or HOLD (Barber-Colman). Press machine START button and let compressor motor come up to speed, then press machine STOP button. Check motor rotation thru sight glass in the motor end bell (Fig. 1). Motor rotation must be clockwise to result in counterclockwise rotation of the compressor (when viewed from motor end).

COMPRESSOR OPERATION

1. Press machine START button and let compressor come up to speed. Press machine STOP button and listen for any unusual sounds coming from the compressor and transmission housing as compressor coasts to a stop.

   NOTE: The antirecycle timer prevents rapid recycling of the compressor and is factory set to allow one start every twenty minutes.

2. Press machine START button and let compressor continue running. Check oil pressure and oil temperature (Fig. 1).
3. Ensure that condenser water and chilled water are circulating, and that chilled water temperature does not drop below the design temperature shown in Job Data.
4. Ensure that the refrigerant agitator solenoid valve(s) are operating. The agitator valve(s) are open when the inlet guide vanes are closed. When the vanes open, and the vane motor crank angle reaches approximately 42° from the vertical centerline, the valve closes. The two valves on the 19DA31 size compressor operate in step sequence at approximately 42° and 28° vane motor crank angle.

   While the inlet guide vanes are being opened manually (see "Motor Overload Module"), listen for the sound of the refrigerant agitator solenoid valve(s) closing.

Setting Safety Controls - Before setting safety controls, set the capacity control to MANUAL (Honeywell) position or HOLD (Barber-Colman). Place a clamp-on ammeter on one of the three starter leads and slowly open prewhirl vanes. (Do not exceed 100 percent full load amperage.) Perform the safety checks in the following table:

Table 2 - Setting Safety Controls

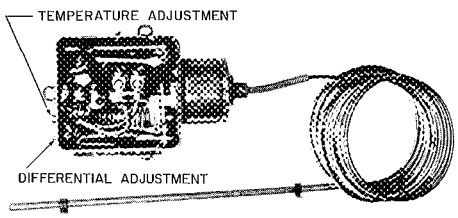
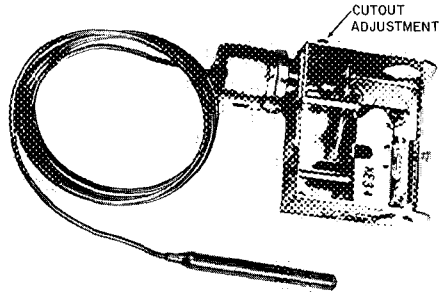
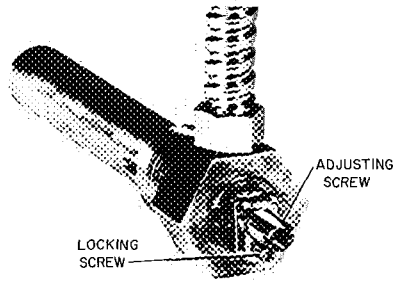
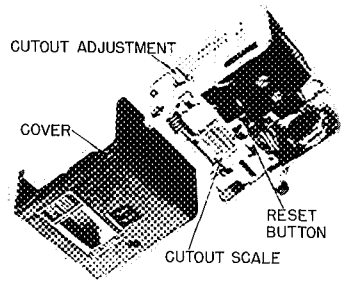
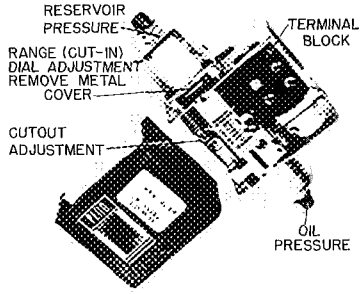
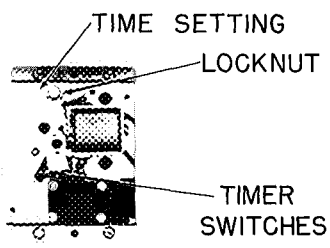
SAFETY OR CONTROL DEVICE	RECOMMENDED SETTING
1. Chilled Water Low-Temperature Cutout and Recycle Switch (Fig. 2) 	1. Set this switch to break at approximately 5 F below design chilled water temperature, or at 36 F, whichever is higher. 2. Set the differential at 10 F plus or minus 1 F so that when the machine shuts down automatically at approximately 5 F below the design chilled water temperature it will restart at approximately 5 F above the design water temperature. 3. This control must break ahead of the refrigerant low-temperature cutout switch or the machine will not recycle automatically.

Table 2 - Setting Safety Controls (Contd)

SAFETY OR CONTROL DEVICE	RECOMMENDED SETTING
2. Refrigerant Low-Temperature Cutout (Fig. 1) 	1. Install jumper wire or mechanical block in the chilled water low-temperature cutout and recycle control. 2. Set the refrigerant low-temperature cutout at 33 F while reading the temperature gage on side of float chamber. 3. Remove jumper wire or block.
3. Oil Heater Thermostat (Fig. 1) 	Set the oil heater thermostat to maintain a minimum oil reservoir temperature of 145 F at shutdown.
4. Condenser High-Pressure Cutout (Fig. 1) 	The condenser high-pressure cutout switch is factory set to shut the machine down when the condenser pressure reaches approximately fifteen psig. Isolate the switch, and check switch setting with a metered supply of air.
5. Low Oil Pressure Cutout (Fig. 1) 	Opens switch contacts on drop in oil pressure. Cutout at 9 psi differential. Cut-in at 14 psi differential. While operating pump manually, note and record reservoir pressure on gage. Remove cap and gasket from oil pressure regulating valve. Loosen locknut. Turn adjusting screw counterclockwise to lower oil pressure to within 4 psi of reservoir pressure. Reset differential to adjust cutout. Set range (cut-in) by turning adjusting dial clockwise, raising oil pressure.
6. Antirecycle Timer (Fig. 1) 	Time setting is factory set for 20 minutes. Limits the number of machine starts to three per hour.

Calibrating Electronic Controls - Honeywell (Fig. 4) or Barber-Colman (Fig. 5)

Table 3 - Motor Overload Module

SEQUENCE	H	B-C	PROCEDURE
1. Check Voltage Signal from current transformer - (leads disconnected)	X	X	A. Shut down compressor:
		X	1. Rotate CR1 (6) and CR2 (7) calibration screws fully clockwise.
	X	X	2. Disconnect leads to terminals 23 and 24 on terminal strip. Attach voltmeter to these leads.
	X	X	3. Place clamp on ammeter on one of three incoming starter wires.
	X	X	B. Start compressor:
	X	X	1. Press START button.
	X		2. Open vanes manually by depressing INCREASE button (5).
		X	3. Place the capacity control switch (15) on HIGHER position to open vanes manually.
			NOTE: At 100 percent full load current, voltmeter must read at least 0.55 volts. If not in this range, check sizing of resistor in starter.
2. Recheck voltage signal (leads connected)	X	X	A. Shut down compressor:
	X	X	1. Remove voltmeter from leads.
	X	X	2. Replace leads to terminals 23 and 24.
	X	X	3. Attach voltmeter to terminals 23 and 24.
	X	X	B. Start the compressor:
	X	X	1. Open vanes manually. Voltmeter must read between 0.45-0.55 volts at 100 percent full load current.
	X	X	2. Press STOP button and remove voltmeter.
3. Calibrate motor current settings (compressor operating)		X	A. Barber-Colman: 1. Open vanes manually until motor current reaches 108 percent of nameplate current.
		X	2. Adjust CR1 calibration screw (6) until vanes begin to close. Observe movement of vane motor linkage.
		X	3. Set capacity control switch (15) on HIGH. When motor reaches 103 percent of full load amperage, adjust CR2 calibration screw (7) until vanes stop moving.
	X		B. Honeywell: 1. When motor current reaches 103 percent of rated amperage, adjust calibration screw (18) until relay CR2 (23) is open and relay CR1 (22) is closed.
	X		2. Hold relay CR2 (23) closed, and open vanes with INCREASE button (5). When motor current reaches 108 percent of rated amperage, relay CR1 (22) should open.
	X	X	C. Honeywell and Barber-Colman: 1. Close vanes and open again to recheck 103 percent and 108 percent settings.

H = Honeywell
B-C = Barber-Colman

Calibrating Electronic Controls - Honeywell Only (Fig. 4)

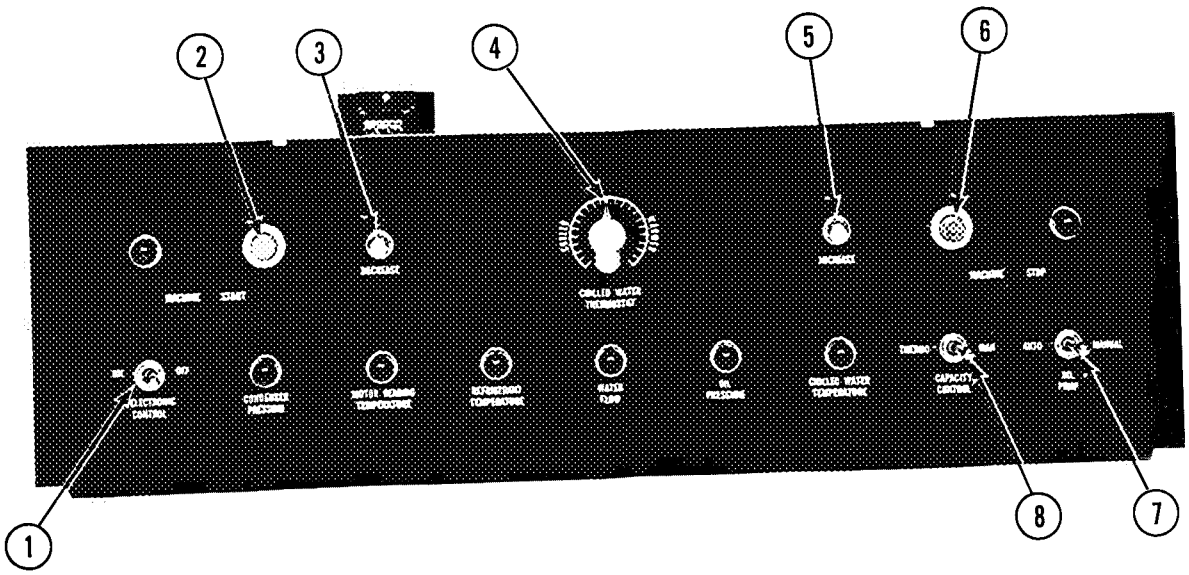
Table 4 - Chilled Water Module

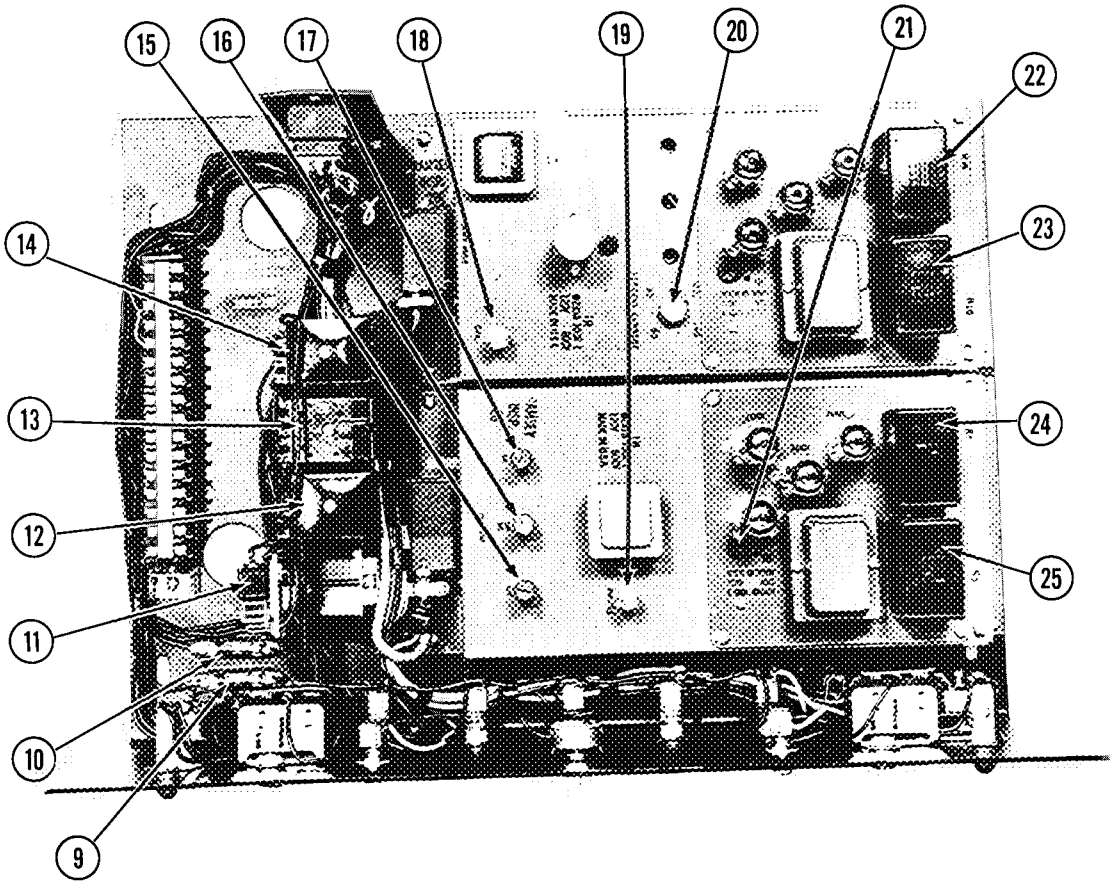
SEQUENCE	PROCEDURE (Compressor Operating)
1. Set Differential Adjustment	A. Place capacity control switch (8) in MANUAL position. B. Set throttling range screw (19) on counterclockwise stop. C. Operate machine manually until leaving chilled water temperature is within the range of the chilled water thermostat (35 F to 55 F). D. Adjust differential screw (15) for a 3/4 F movement of the chilled water thermostat (4) between the operation of relay CRO (25) and CRC (24).
2. Calibrate Chilled Water Temperature Setting	A. Open vanes manually until chilled water temperature reaches design temperature. Place chilled water thermostat in center of dial. (Lowest division on left corresponds to 35 F. Each division represents 1 F.) B. Adjust calibration screw (17) until relay CRC (24) is closed and relay CRO (25) is open.
3. Adjust Capacity Balance	A. Connect an a-c voltmeter across test jack (21) and terminal J28. Use 50- or 60-volt scale. B. Turn chilled water thermostat (4) clockwise or counterclockwise to obtain lowest voltage reading on voltmeter. C. Turn capacity balance screw (16) clockwise or counterclockwise until voltage decreases further. D. Repeat above steps to decrease voltage to approximately one volt.
4. Observe Automatic Operation	A. Place capacity control (8) on THERMO position and thermostat (4) at design chilled water temperature. B. Turn throttle range screw (19) clockwise 1/3 of its total travel if chilled water temperature "hunts." C. Recalibrate as in sequences 1 thru 4.

Calibrating Electronic Controls - Barber-Colman Only (Fig. 5)

Table 5 - Chilled Water Module

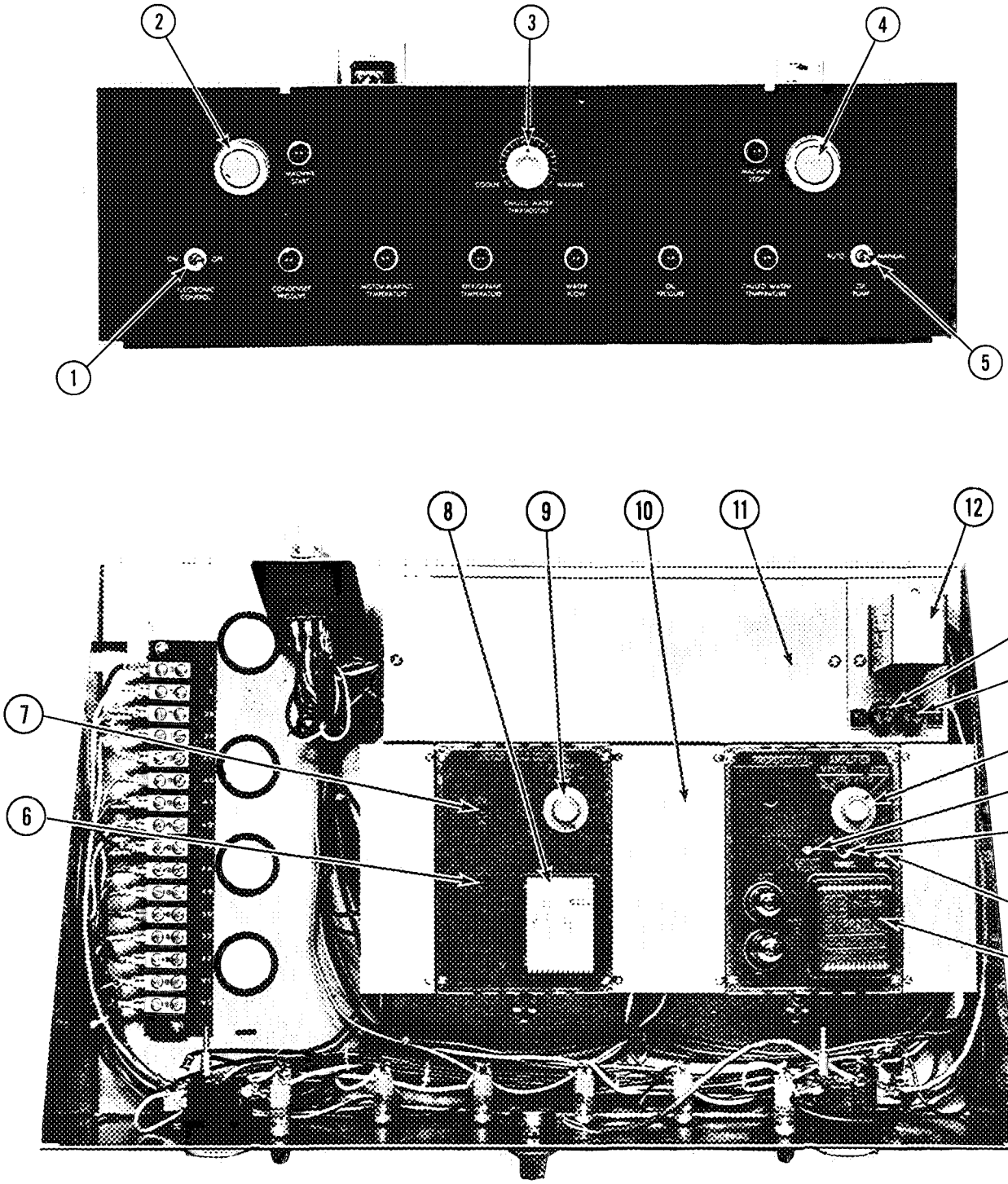
SEQUENCE	PROCEDURE (Compressor Operating)
1. Adjust Capacity Balance	A. Rotate throttling range screw (17) to counterclockwise position. B. Operate vanes manually until chilled water temperature drops to design temperature. C. Place capacity control switch (15) on HOLD. D. Set chilled water thermostat (3) to dial center. (Lowest division on left corresponds to 35 F. Each division represents 1 F.) E. Connect COMMON plug of an a-c voltmeter to terminal X on amplifier and other plug to terminal T. Use 12-volt scale. F. Adjust temperature bridge calibration screw (18) until voltage becomes minimum. G. Adjust capacity balance screw (16) until voltage decreases further. Repeat steps above to decrease voltage to one volt or lower. H. Remove voltmeter.
2. Differential Setting	NOTE: A differential resistor is factory installed between terminals X and Y (10) on the chilled water amplifier to give approximately 1 F differential between the operation of microrelays CRC and CRO (19).
3. Observe Automatic Operation	A. Place capacity control switch (15) on AUTO position. B. Rotate throttling range screw (17) clockwise 1/3 of total travel if chilled water temperature "hunts." NOTE: If throttling range is added, recalibrate as in sequences 1 thru 3.





1 ELECTRONIC CONTROL ON-OFF SWITCH
2 MACHINE START BUTTON
3 VANE DECREASE BUTTON
4 CHILLED WATER THERMOSTAT
5 VANE INCREASE BUTTON
6 MACHINE STOP BUTTON
7 OIL PUMP AUTO-MANUAL SWITCH
8 CAPACITY CONTROL THERMOSTATIC-MANUAL SWITCH
9 3-AMP FUSE - SAFETY CONTROL CIRCUIT
10 3-AMP FUSE - REFRIGERANT PUMP
11 OIL PUMP TIME DELAY RELAY
12 RELAY R-4
13 RELAY R-2
14 RELAY R-1
15 DIFFERENTIAL ADJUSTING SCREW
16 CAPACITY BALANCE ADJUSTING SCREW
17 CALIBRATION ADJUSTING SCREW - CHILLED WATER
18 CALIBRATION ADJUSTING SCREW - MOTOR LOAD
19 THROTTLING RANGE ADJUSTING SCREW
20 ELECTRICAL DEMAND CONTROL KNOB
21 TEST JACK
22 RELAY CR1
23 RELAY CR2
24 RELAY CRC
25 RELAY CRO

Fig. 4 - Honeywell Controls



1 ELECTRONIC CONTROL ON-OFF SWITCH
2 MACHINE START BUTTON
3 CHILLED WATER THERMOSTAT
4 MACHINE STOP BUTTON
5 OIL PUMP AUTO-MANUAL SWITCH
6 CR1 CALIBRATION ADJUSTING SCREW - MOTOR LOAD
7 CR2 CALIBRATION ADJUSTING SCREW - MOTOR LOAD
8 MOTOR LOAD MICRORELAY
9 ELECTRICAL DEMAND CONTROL KNOB
10 MODULE TERMINALS (HIDDEN)
11 RELAYS R1 (TOP), R2 (BOTTOM), (HIDDEN)
12 OIL PUMP TIME DELAY RELAY
13 3-AMP FUSE - REFRIGERANT PUMP
14 3-AMP FUSE - SAFETY CONTROL CIRCUIT
15 CAPACITY CONTROL AUTO-MANUAL SWITCH
16 CAPACITY BALANCE ADJUSTING SCREW - SENS
17 THROTTLING RANGE ADJUSTING SCREW
18 CALIBRATION ADJUSTING SCREW - TEMPERATURE BRIDGE
19 CHILLED WATER MICRORELAY

Fig. 5 - Barber-Colman Controls

Calibrating Pneumatic Transducer - Pneumatic control is accomplished by a transformer which converts a 3-15 psi pneumatic signal regulated by a thermostat sensing chilled water temperature into an electrical signal. The electrical signal is transmitted to either a Barber-Colman or Honeywell Electronic Chilled Water Module to provide chilled water temperature control. The same transducer is used for both Barber-Colman (Fig. 5) and Honeywell (Fig. 4).

MOTOR OVERLOAD MODULE - Calibrate as outlined under the motor overload sections under Barber-Colman or Honeywell.

CHILLED WATER MODULE - Calibrate the Chilled Water Module as outlined in Table 6 for Barber-Colman or Honeywell.

Table 6 - Chilled Water Module

SEQUENCE	PROCEDURE
1. Supply fixed air signal to transducer (Fig. 6)	Use either air signal from control thermostat or separate air supply (such as a medical aspirator) to introduce 9 psi signal to transducer diaphragm and hold. Coil wiper arm (Fig. 6), should be in center of resistance coil.
2. Preset chilled water thermostat set point	Turn thermostat dial (4) Honeywell (Fig. 4), or (3) Barber-Colman (Fig. 5) to center of scale (vertical).
3. Add throttling range	Turn the throttling range screw (19) Honeywell, or (17) Barber-Colman 1/3 of total clockwise travel.
4. Place machine in manual control and start the compressor	Turn switch (8) Honeywell to MANUAL position. Place the capacity control switch (15) Barber-Colman on HOLD.
5. To complete the electro-pneumatic chilled water control calibration	Refer to Table 5 - Barber-Colman, perform steps 1 (E thru H), and 3 (A and B) or refer to Table 4 - Honeywell, perform steps 1 (D), 2 (B), 3 (A thru D), and 4 (A and B).

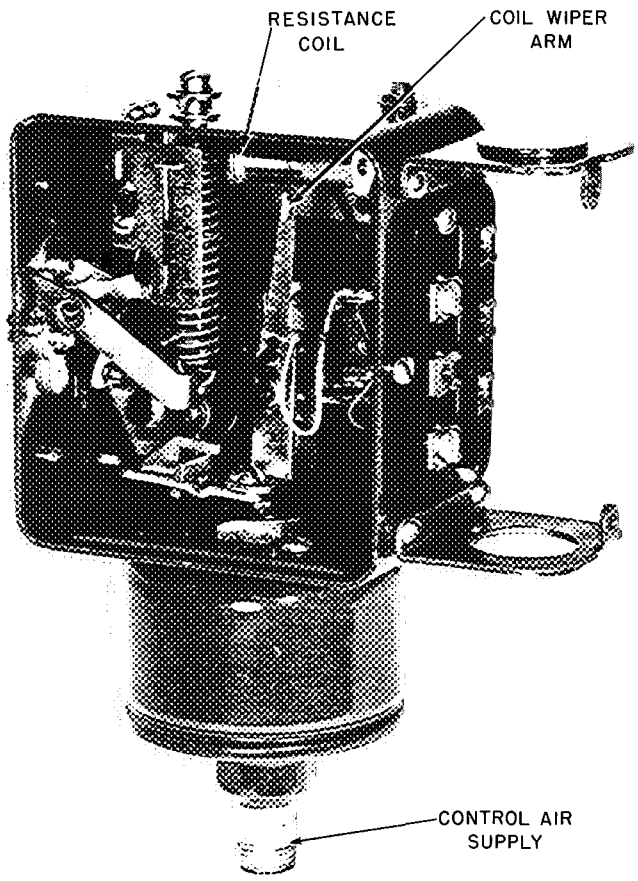


Fig. 6 - 19DA Transducer Assembly (For either Honeywell or Barber-Colman)

Trimming Refrigerant Charge - After the machine has been placed in operation, it may be necessary to adjust the refrigerant charge to obtain optimum machine performance.

When a machine full load is available, add the remaining refrigerant slowly until the difference between the leaving chilled water temperature and the cooler temperature reaches design conditions or becomes a minimum. Shut the machine down and allow refrigerant to drain to the cooler, mark the level indicator and maintain that shutdown refrigerant level.

INSTRUCTING THE CUSTOMER OPERATOR

Use the following as a guide in giving operating instructions to the customer operator:

1. Be sure that the customer operator has a copy of the 19DA Operation and Maintenance Instructions and has read them carefully.
2. Point out the following components and explain function of each.
   a. Control Panel
   b. Automatic Thermal Purge System
   c. Compressor-Motor-Transmission Assembly
      (1) Prewhirl Guide Vanes, Vane Motor and Linkage
      (2) Refrigerant-Cooled Motor
      (3) Transmission
   d. Unishell Cooler-Condenser
      (1) Float Chamber
      (2) Rupture Disc
      (3) Refrigerant Charging Line
      (4) Refrigerant Agitator Lines
      (5) Purge Collection Chamber
   e. Oil Cooler-Filter-Pump Assembly
   f. Auxiliary Gages and Thermometers
3. Describe the Refrigeration Cycle.
4. Describe the Compressor Lubricating Oil System.
   a. Oil heater and thermostat function and setting of oil temperature
   b. Oil level requirements
5. Point out safety and operating controls and explain function of each.
   a. Standard Controls
   b. Special Controls (if installed)
6. Explain Oil Cooler Water System.
   a. Solenoid Valve
   b. Water Plug Cock
7. Describe Purge Cycle.
   a. Valve Designation
   b. Controls and Settings
   c. Importance of proper purge operation
8. Review general maintenance items.
   a. Daily, Monthly, Yearly
   b. Extended Shutdowns
   c. Point out importance of maintaining Log Sheet
   d. Importance of water treatment
9. Check operator's knowledge of machine.
   a. Start and Stop Procedure
   b. Safety and Operating Controls
10. Advise the customer operator regarding spare parts ordering and Carrier service available.
11. Review the Operation and Maintenance Instructions.